FIG. 1

Tobamovirus Expression Vectors

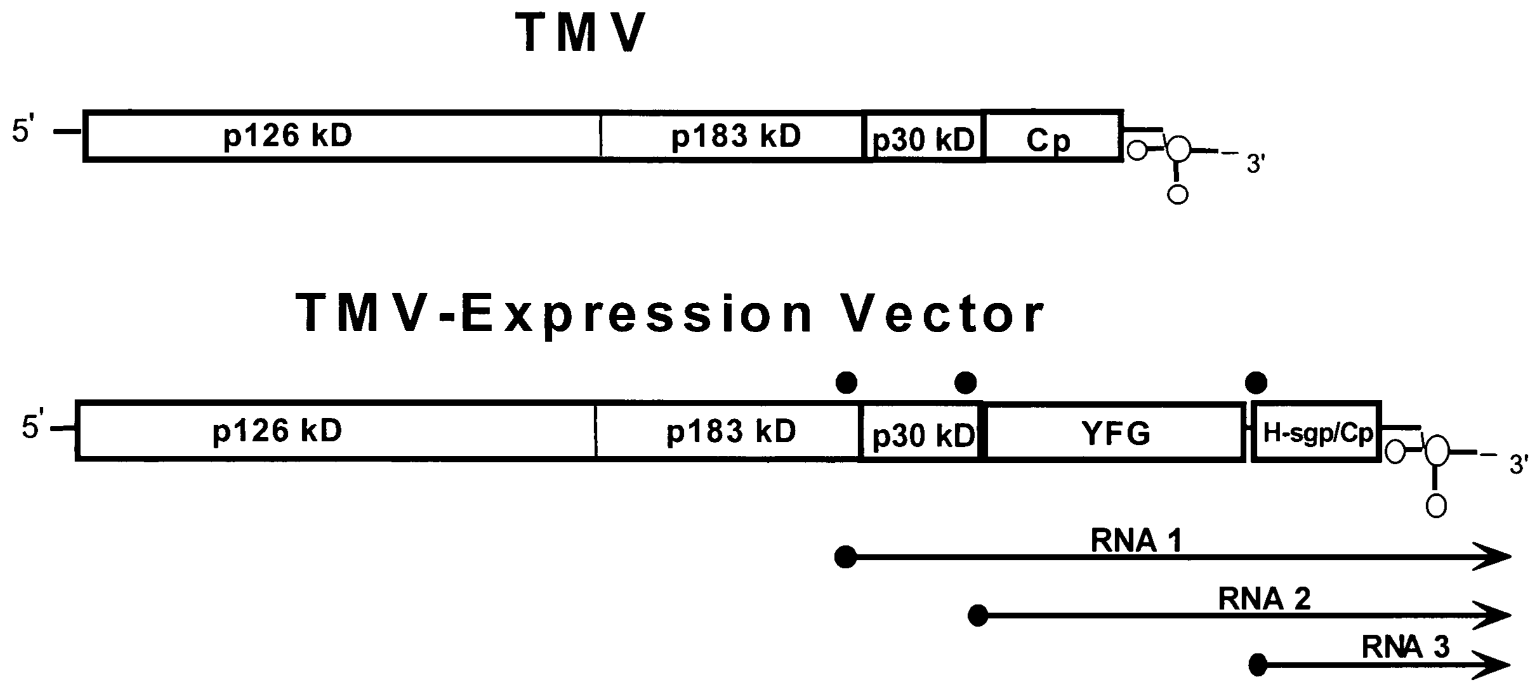


FIG. 2

Tobamovirus Vector for rGal-A Expression

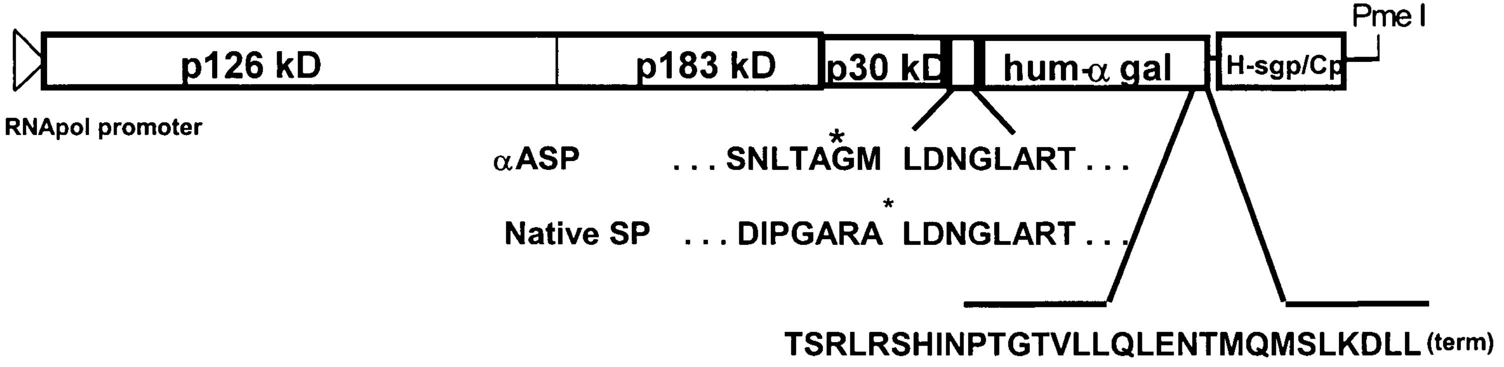

Pme I
p126 kD
p183 kD
p30 kD
hum-α gal
H-sgp/Cp
RNApol promoter
αASP ... SNLTA*GM LDNGLART ...
Native SP ... DIPGARA* LDNGLART ...
TSRLRSHINPTGTVLLQLENTMQMSLKDLL (term)

FIG. 3

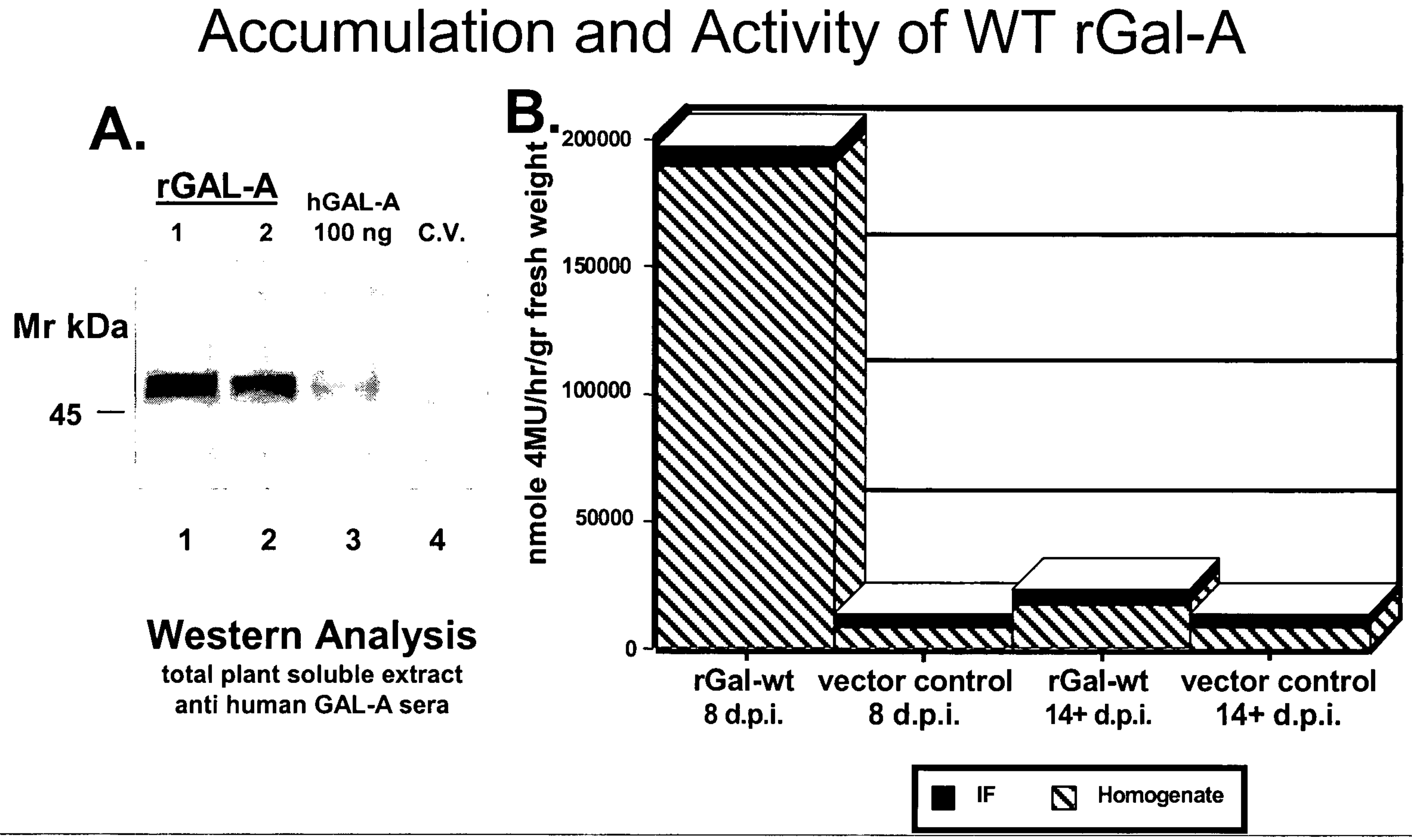

Accumulation and Activity of WT rGal-A

FIG. 4

Accumulation and Activity
of WT and ER-Targeted rGal-A

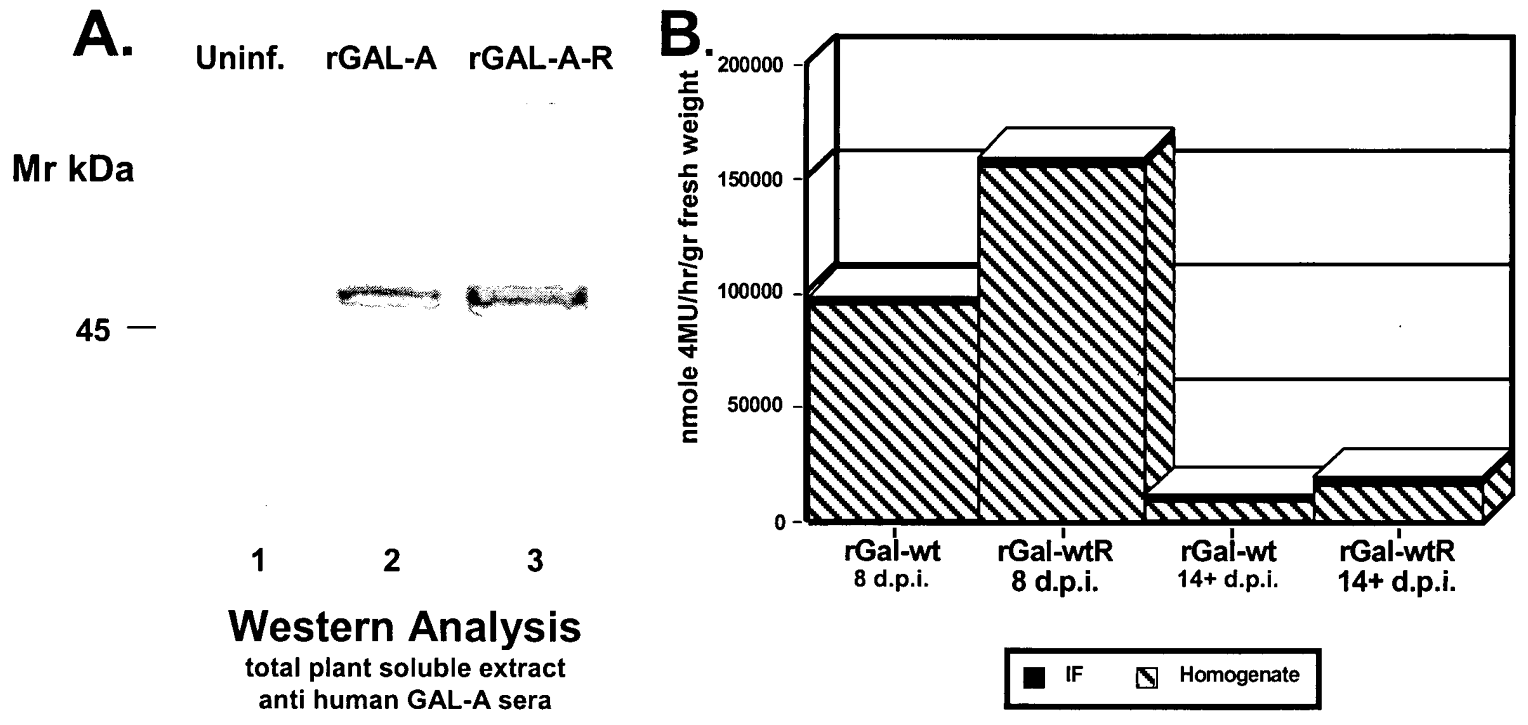


FIG. 5

Carboxy-Modifications to rGal-A

	-30 - 20 -10
WT	T$\overset{*}{\text{S}}$RLRSHINPTGTVLLQLENTMQMSLKDLL
WTR	TSRLRSHINPTGTVLLQLENTMQMSLKDLLSEKDEL
Δ4	TSRLRSHINPTGTVLLQLENTMQMSL
Δ4R	TSRLRSHINPTGTVLLQLENTMQMSLSEKDEL
Δ8	TSRLRSHINPTGTVLLQLENTM
Δ8R	TSRLRSHINPTGTVLLQLENTMSEKDEL
Δ12	TSRLRSHINPTGTVLLQL
Δ12R	TSRLRSHINPTGTVLLQLSEKDEL
Δ25	TSRLR
Δ25R	TSRLRSEKDEL

Control virus (GFP, AMP, IFN g)

*potential CTPP cleavage (Gene 58:177,1987).

FIG. 6

Western Blot Analysis of Carboxy-modified rGal-A

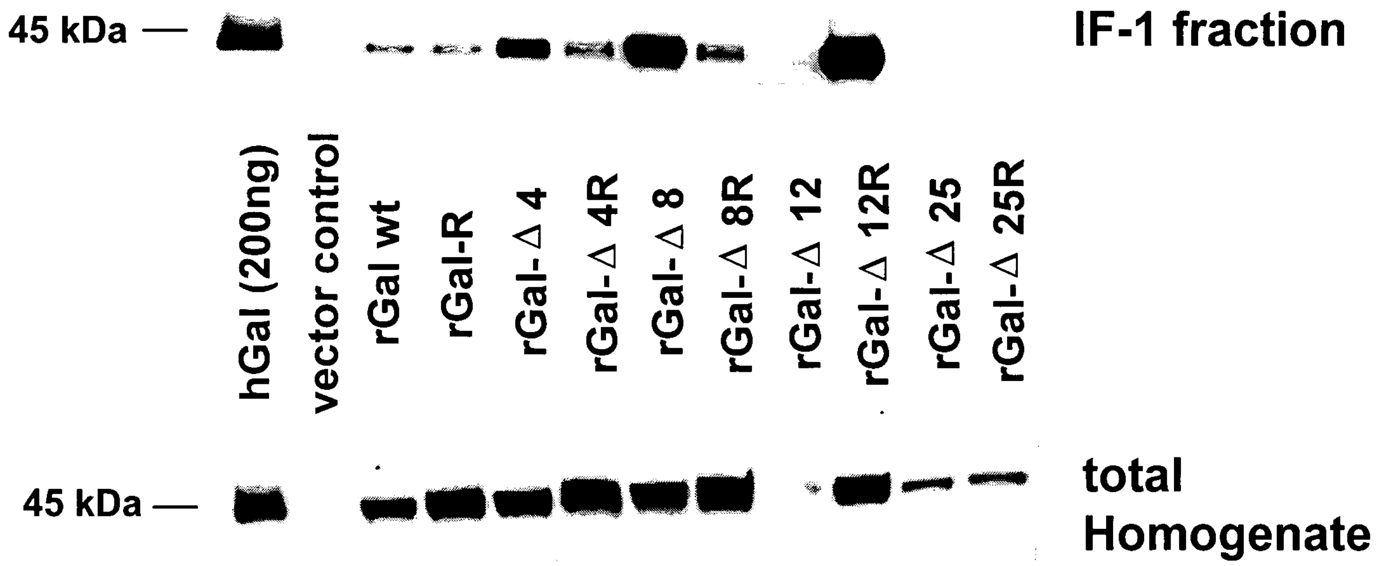
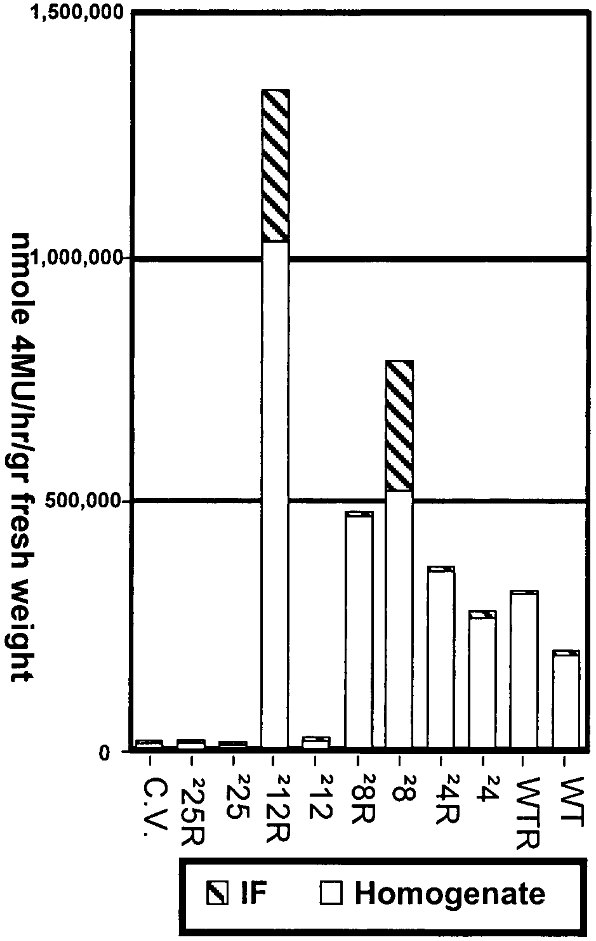


FIG. 7

Enzymatic Activity of Carboxy-Modified rGal-A



	-30 -20 -10 *
WT	TSRLRSHINPTGTVLLQLENTMQMSLKDLL
WTR	TSRLRSHINPTGTVLLQLENTMQMSLKDLLSEKDEL
^{2}4	TSRLRSHINPTGTVLLQLENTMQMSL
^{2}4R	TSRLRSHINPTGTVLLQLENTMQMSLSEKDEL
^{2}8	TSRLRSHINPTGTVLLQLENTM
^{2}8R	TSRLRSHINPTGTVLLQLENTMSEKDEL
^{2}12	TSRLRSHINPTGTVLLQL
^{2}12R	TSRLRSHINPTGTVLLQLSEKDEL
^{2}25	TSRLR
^{2}25R	TSRLRSEKDEL

Control virus (GFP, AMP, IFN9)

* potentialCTPP cleavage (Gene 58:177,1987).

FIG. 8

Coomassie Stain - IF

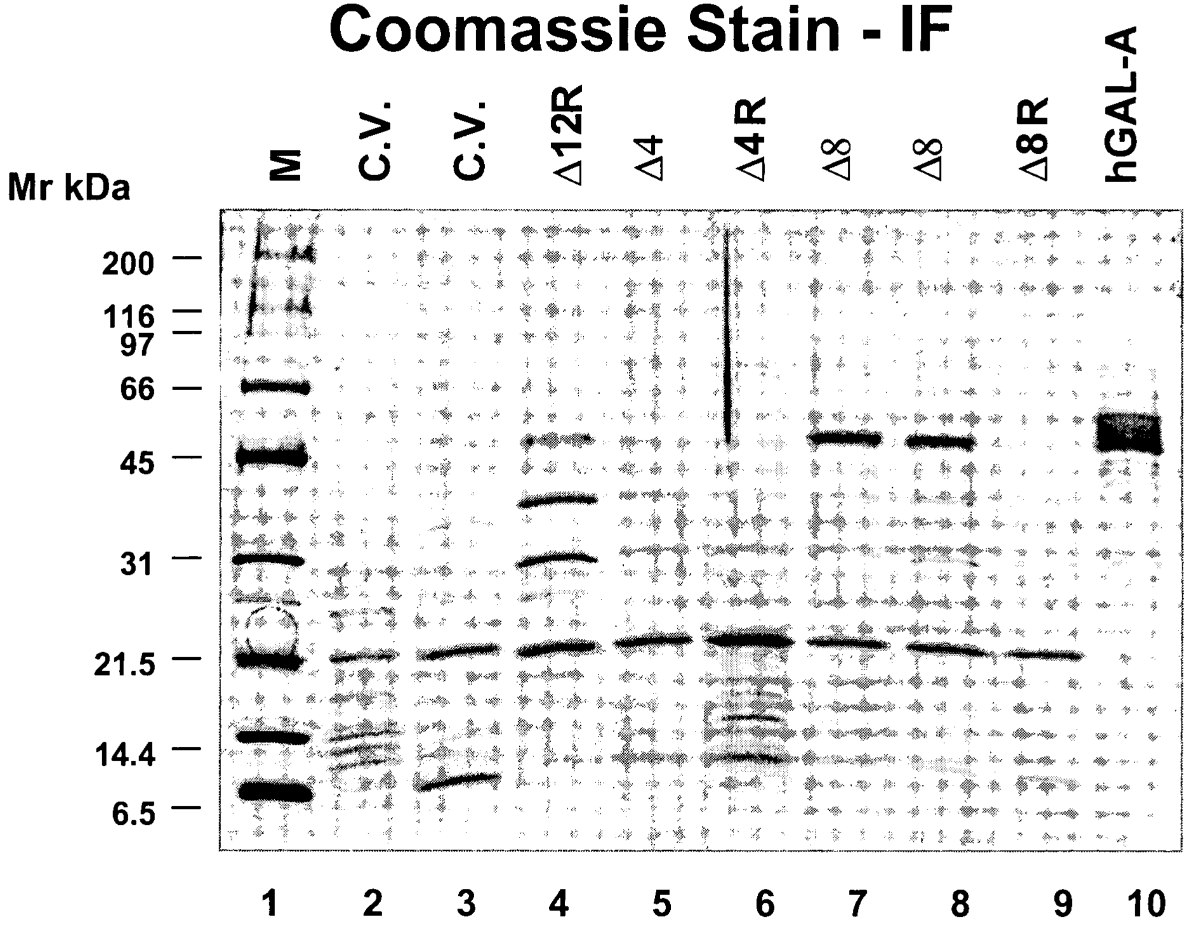


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FIG. 9

Coomassie Stain - IF

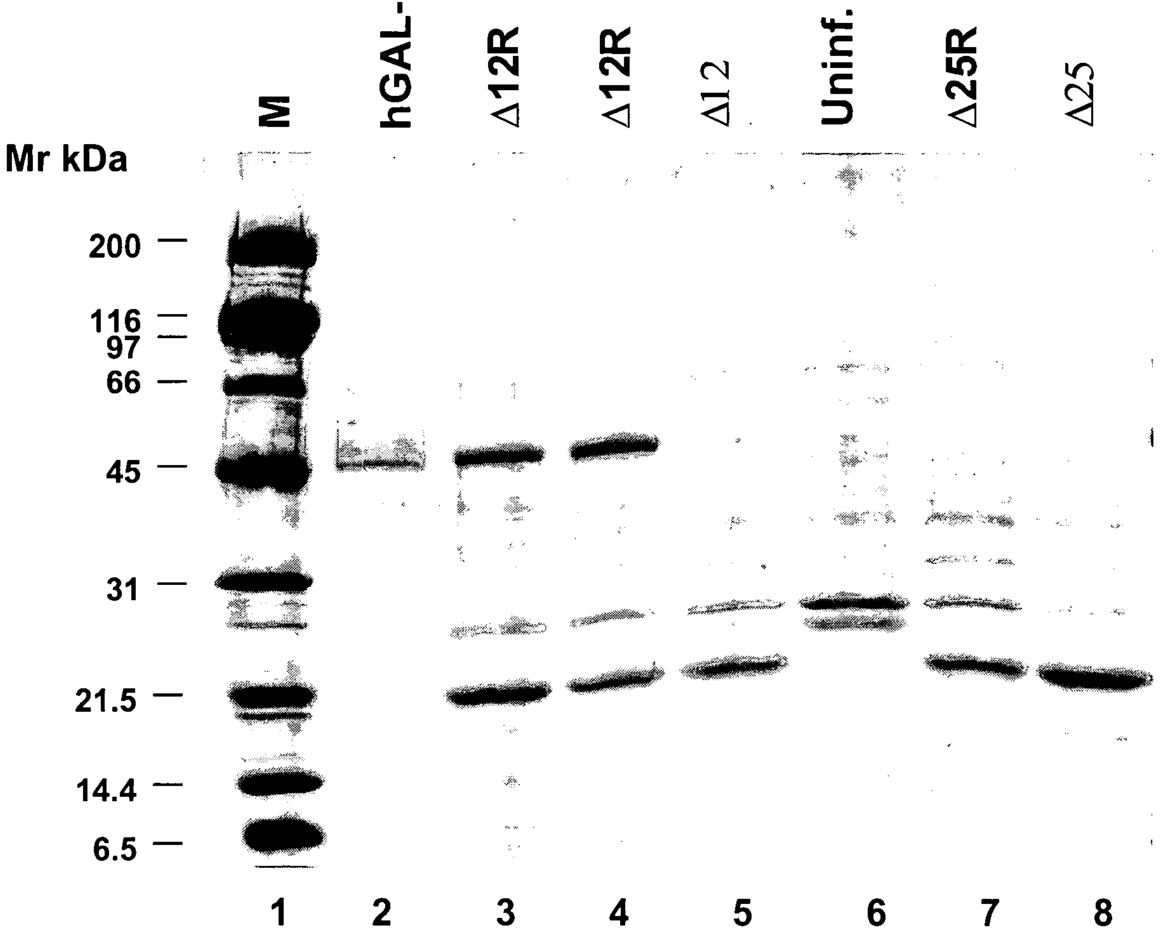

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FIG. 10

Schematic of rGal-A Secretion

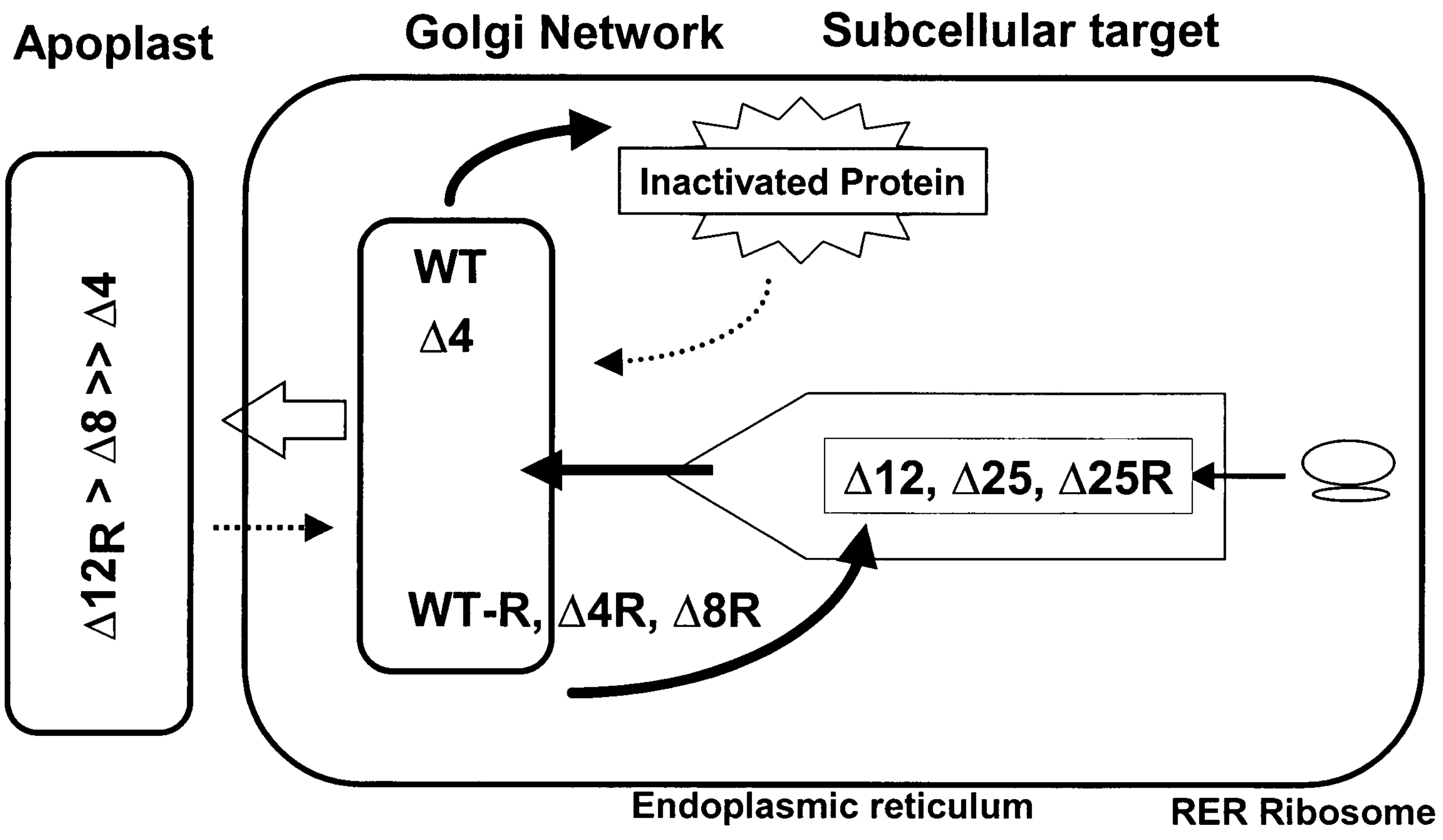
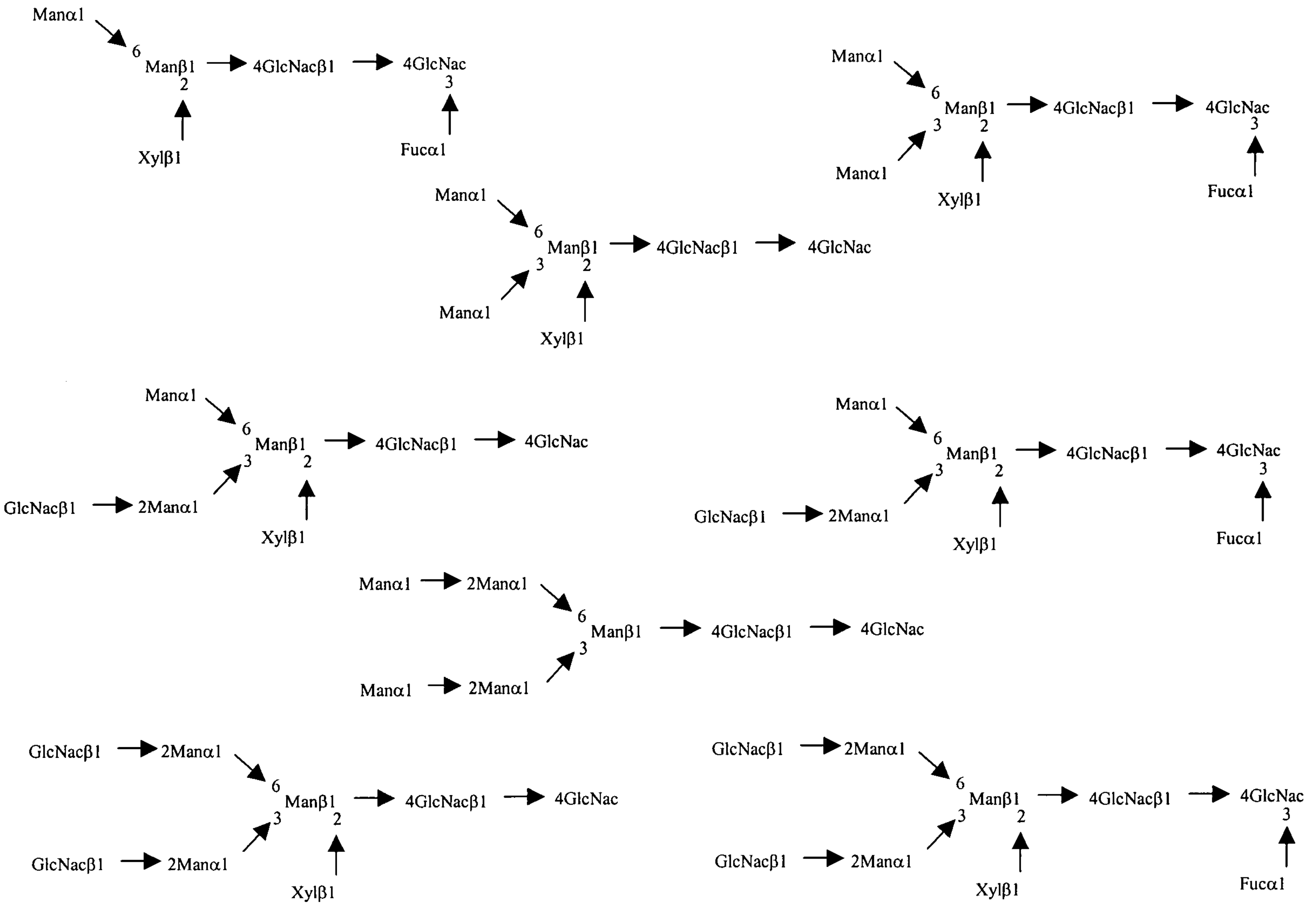


FIG. 11



Manα1
6
Manβ1
2
Xylβ1
4GlcNacβ1
4GlcNac
3
Fucα1
Manα1
6
3
Manβ1
2
Manα1
Xylβ1
4GlcNacβ1
4GlcNac
Manα1
6
3
Manβ1
2
Manα1
Xylβ1
4GlcNacβ1
4GlcNac
3
Fucα1
Manα1
6
3
Manβ1
2
GlcNacβ1
2Manα1
Xylβ1
4GlcNacβ1
4GlcNac
Manα1
6
3
Manβ1
2
GlcNacβ1
2Manα1
Xylβ1
4GlcNacβ1
4GlcNac
3
Fucα1
Manα1
2Manα1
6
3
Manβ1
Manα1
2Manα1
4GlcNacβ1
4GlcNac
GlcNacβ1
2Manα1
6
3
Manβ1
2
GlcNacβ1
2Manα1
Xylβ1
4GlcNacβ1
4GlcNac
GlcNacβ1
2Manα1
6
3
Manβ1
2
GlcNacβ1
2Manα1
Xylβ1
4GlcNacβ1
4GlcNac
3
Fucα1

FIG. 12-1

```
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GGTGGATTGCGATCTTTAGAACTGGAATATCTGATGATGCAAATTCCCTACGGATCATTGACTTATGACATAGGCGGGAA
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ACGAAGGCCAGAAAGACAGTATTGAACTATACCTTTCTAGGCTAGAGAGAGGGGGGAAAACAGTCCCCAACTTCCAAAAG
GAAGCATTTGACAGATACGCAGAAATTCCTGAAGACGCTGTCTGTCACAATACTTTCCAGACAATGCGACATCAGCCGAT
GCAGCAATCAGGCAGAGTGTATGCCATTGCGCTACACAGCATATATGACATACCAGCCGATGAGTTCGGGGCGGCACTCT
TGAGGAAAAATGTCCATACGTGCTATGCCGCTTTCCACTTCTCTGAGAACCTGCTTCTTGAAGATTCATACGTCAATTTG
GACGAAATCAACGCGTGTTTTTCGCGCGATGGAGACAAGTTGACCTTTTCTTTTGCATCAGAGAGTACTCTTAATTATTG
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CATTAACGGTGTGACAGCGAGGTCCGAATGGGATGTGGACAAATCTTTGTTACAATCCTTGTCCATGACGTTTTACCTGC
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GGCAGGCGACGCATTAGAGATCAGGGTGCCTGATCTATATGTGACCTTCCACGACAGATTAGTGACTGAGTACAAGGCCT
CTGTGGACATGCCTGCGCTTGACATTAGGAAGAAGATGGAAGAAACGGAAGTGATGTACAATGCACTTTCAGAGTTATCG
GTGTTAAGGGAGTCTGACAAATTCGATGTTGATGTTTTTTCCCAGATGTGCCAATCTTTGGAAGTTGACCCAATGACGGC
AGCGAAGGTTATAGTCGCGGTCATGAGCAATGAGAGCGGTCTGACTCTCACATTTGAACGACCTACTGAGGCGAATGTTG
CGCTAGCTTTACAGGATCAAGAGAAGGCTTCAGAAGGTGCTTTGGTAGTTACCTCAAGAGAAGTTGAAGAACCGTCCATG
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GGAGATAGAGTCTTTAGAGCAGTTTCATATGGCAACGGCAGATTCGTTAATTCGTAAGCAGATGAGCTCGATTGTGTACA
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TGGAATATGATGAGCAGGGTGTGGTGACATGCGATGATTGGAGAAGAGTAGCTGTCAGCTCTGAGTCTGTTGTTTATTCC
GACATGGCGAAACTCAGAACTCTGCGCAGACTGCTTCGAAACGGAGAACCGCATGTCAGTAGCGCAAAGGTTGTTCTTGT
GGACGGAGTTCCGGGCTGTGGAAAAACCAAAGAAATTCTTTCCAGGGTTAATTTTGATGAAGATCTAATTTTAGTACCTG
GGAAGCAAGCCGCGGAAATGATCAGAAGACGTGCGAATTCCTCAGGGATTATTGTGGCCACGAAGGACAACGTTAAAACC
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GCATACTGGTTGTGTTAATTTTCTTGTGGCGATGTCATTGTGCGAAATTGCATATGTTTACGGAGACACACAGCAGATTC
CATACATCAATAGAGTTTCAGGATTCCCGTACCCCGCCCATTTTGCCAAATTGGAAGTTGACGAGGTGGAGACACGCAGA
ACTACTCTCCGTTGTCCAGCCGATGTCACACATTATCTGAACAGGAGATATGAGGGCTTTGTCATGAGCACTTCTTCGGT
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TTCAAAGGTTCCAATCTTTTTGTTGCAGCGCCAAAGACTGGTGATATTTCTGATATGCAGTTTTACTATGATAAGTGTCT
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GCATATTGGATATGTCTAAGTCTGTTGCTGCGCCTAAGGATCAAATCAAACCACTAATACCTATGGTACGAACGGCGGCA
GAAATGCCACGCCAGACTGGACTATTGGAAAATTTAGTGGCGATGATTAAAAGGAACTTTAACGCACCCGAGTTGTCTGG
CATCATTGATATTGAAAATACTGCATCTTTAGTTGTAGATAAGTTTTTTGATAGTTATTTGCTTAAAGAAAAAAGAAAAC
CAAATAAAAATGTTTCTTTGTTCAGTAGAGAGTCTCTCAATAGATGGTTAGAAAAGCAGGAACAGGTAACAATAGGCCAG
CTCGCAGATTTTGATTTTGTAGATTTGCCAGCAGTTGATCAGTACAGACACATGATTAAAGCACAACCCAAGCAAAAATT
GGACACTTCAATCCAAACGGAGTACCCGGCTTTGCAGACGATTGTGTACCATTCAAAAAAGATCAATGCAATATTTGGCC
CGTTGTTTAGTGAGCTTACTAGGCAATTACTGGACAGTGTTGATTCGAGCAGATTTTTGTTTTTCACAAGAAAGACACCA
GCGCAGATTGAGGATTTCTTCGGAGATCTCGACAGTCATGTGCCGATGGATGTCTTGGAGCTGGATATATCAAAATACGA
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FIG. 12-2

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CAAATCTCAGAATGAATTCCACTGTGCAGTAGAATACGAGATCTGGCGAAGATTGGGTTTTGAAGACTTCTTGGGAGAAG
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AGCGGGGACGTCACGACGTTCATTGGAAACACTGTGATCATTGCTGCATGTTTGGCCTCGATGCTTCCGATGGAGAAAAT
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CGAATCTTATGTGGAATTTTGAAGCAAAACTGTTTAAAAAACAGTATGGATACTTTTGCGGAAGATATGTAATACATCAC
GACAGAGGATGCATTGTGTATTACGATCCCCTAAAGTTGATCTCGAAACTTGGTGCTAAACACATCAAGGATTGGGAACA
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CTTTTTAGAAGTTTGTTTATAGATGGCTCTAGTTGTTAAAGGAAAAGTGAATATCAATGAGTTTATCGACCTGACAAAAA
TGGAGAAGATCTTACCGTCGATGTTTACCCCTGTAAAGAGTGTTATGTGTTCCAAAGTTGATAAAATAATGGTTCATGAG
AATGAGTCATTGTCAGAGGTGAACCTTCTTAAAGGAGTTAAGCTTATTGATAGTGGATACGTCTGTTTAGCCGGTTTGGT
CGTCACGGGCGAGTGGAACTTGCCTGACAATTGCAGAGGAGGTGTGAGCGTGTGTCTGGTGGACAAAAGGATGGAAAGAG
CCGACGAGGCCACTCTCGGATCTTACTACACAGCAGCTGCAAAGAAAAGATTTCAGTTCAAGGTCGTTCCCAATTATGCT
ATAACCACCCAGGACGCGATGAAAAACGTCTGGCAAGTTTTAGTTAATATTAGAAATGTGAAGATGTCAGCGGGTTTCTG
TCCGCTTTCTCTGGAGTTTGTGTCGGTGTGTATTGTTTATAGAAATAATATAAAATTAGGTTTGAGAGAGAAGATTACAA
ACGTGAGAGACGGAGGGCCCATGGAACTTACAGAAGAAGTCGTTGATGAGTTCATGGAAGATGTCCCTATGTCGATCAGG
CTTGCAAAGTTTCGATCTCGAACCGGAAAAAAGAGTGATGTCCGCAAAGGGAAAAATAGTAGTAATGATCGGTCAGTGCC
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CTACTGTCGCCGAATCGGATTCGTTTTAAATAGATCTTACAGTATCACTACTCCATCTCAGTTCGTGTTCTTGTCATTAA
TATGCAGGTGCTGAACACCATGGTGAACAAACACTTCTTGTCCCTTTCGGTCCTCATCGTCCTCCTTGGCCTCTCCTCCA
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AACCTTGACTGCCAGGAAGAGCCAGATTCCTGCATCAGTGAGAAGCTCTTCATGGAGATGGCAGAGCTCATGGTCTCAGA
AGGCTGGAAGGATGCAGGTTATGAGTACCTCTGCATTGATGACTGTTGGATGGCTCCCCAAAGAGATTCAGAAGGCAGAC
TTCAGGCAGACCCTCAGCGCTTTCCTCATGGGATTCGCCAGCTAGCTAATTATGTTCACAGCAAAGGACTGAAGCTAGGG
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TGCTGACTGGGGAGTAGATCTGCTAAAATTTGATGGTTGTTACTGTGACAGTTTGGAAAATTTGGCAGATGGTTATAAGC
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GCTTAGCCTGGGCTGTAGCTATGATAAACCGGCAGGAGATTGGTGGACCTCGCTCTTATACCATCGCAGTTGCTTCCCTG
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GCAGAGTCCGACAACAGCTGAAACGTTAGATGCTACCCGCAGGGTAGACGACGCTACGGTTGCAATTCGGTCTGCTATAA
ATAATTTAGTTAATGAACTAGTAAGAGGTACTGGACTGTACAATCAGAATACTTTTGAAAGTATGTCTGGGTTGGTCTGG
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CCCTGATAAATGCTTCAATAATATTGAAAAAGGAAGAGTATGAGTATTCAACATTTCCGTGTCGCCCTTATTCCCTTTTT
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GAGTGGGTTACATCGAACTGGATCTCAACAGCGGTAAGATCCTTGAGAGTTTTCGCCCCGAAGAACGTTTTCCAATGATG
AGCACTTTTAAAGTTCTGCTATGTGGCGCGGTATTATCCCGTGTTGACGCCGGGCAAGAGCAACTCGGTCGCCGCATACA
CTATTCTCAGAATGACTTGGTTGAGTACTCACCAGTCACAGAAAAGCATCTTACGGATGGCATGACAGTAAGAGAATTAT
```

FIG. 12-3

GCAGTGCTGCCATAACCATGAGTGATAACACTGCGGCCAACTTACTTCTGACAACGATCGGAGGACCGAAGGAGCTAACC
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CGAGCGTGACACCACGATGCCTGCAGCAATGGCAACAACGTTGCGCAAACTATTAACTGGCGAACTACTTACTCTAGCTT
CCCGGCAACAATTAATAGACTGGATGGAGGCGGATAAAGTTGCAGGACCACTTCTGCGCTCGGCCCTTCCGGCTGGCTGG
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AAAAGGATCTAGGTGAAGATCCTTTTTGATAATCTCATGACCAAAATCCCTTAACGTGAGTTTTCGTTCCACTGAGCGTC
AGACCCCGTAGAAAAGATCAAAGGATCTTCTTGAGATCCTTTTTTTCTGCGCGTAATCTGCTGCTTGCAAACAAAAAAAC
CACCGCTACCAGCGGTGGTTTGTTTGCCGGATCAAGAGCTACCAACTCTTTTTCCGAAGGTAACTGGCTTCAGCAGAGCG
CAGATACCAAATACTGTCCTTCTAGTGTAGCCGTAGTTAGGCCACCACTTCAAGAACTCTGTAGCACCGCCTACATACCT
CGCTCTGCTAATCCTGTTACCAGTGGCTGCTGCCAGTGGCGATAAGTCGTGTCTTACCGGGTTGGACTCAAGACGATAGT
TACCGGATAAGGCGCAGCGGTCGGGCTGAACGGGGGGTTCGTGCACACAGCCCAGCTTGGAGCGAACGACCTACACCGAA
CTGAGATACCTACAGCGTGAGCTATGAGAAAGCGCCACGCTTCCCGAAGGGAGAAAGGCGGACAGGTATCCGGTAAGCGG
CAGGGTCGGAACAGGAGAGCGCACGAGGGAGCTTCCAGGGGGAAACGCCTGGTATCTTTATAGTCCTGTCGGGTTTCGCC
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CGGGCCATGTTAAGGGCGGTTTTTTCCTGTTTGGTCACTTGATGCCTCCGTGTAAGGGGGAATTTCTGTTCATGGGGGTA
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CCGTGACGATCAGCGGTCCAGTGATCGAAGTTAGGCTGGTAAGAGCCGCGAGCGATCCTTGAAGCTGTCCCTGATGGTCG
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AGGCTCTCAAGGGCATCGGTCGAGATTTAGGTGACACTATA

FIG. 13-1

GTATTTTTACAACAATTACCAACAACAACAAACAACAGACAACATTACAATTACTATTTACAATTACAATGGCATACACA
CAGACAGCTACCACATCAGCTTTGCTGGACACTGTCCGAGGAAACAACTCCTTGGTCAATGATCTAGCAAAGCGTCGTCT
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GGTGGATTGCGATCTTTAGAACTGGAATATCTGATGATGCAAATTCCCTACGGATCATTGACTTATGACATAGGCGGGAA
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TGGGATGAGATTTCGCTGGCGTTTGGGAACGCATTTCCCTCCGTGAAAGAGAGGCTCTTGAACAGGAAACTTATCAGAGT
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CTGTGGACATGCCTGCGCTTGACATTAGGAAGAAGATGGAAGAAACGGAAGTGATGTACAATGCACTTTCAGAATTATCG
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FIG. 13-2

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TRANSGENIC VECTOR FOR rGCB EXPRESSION

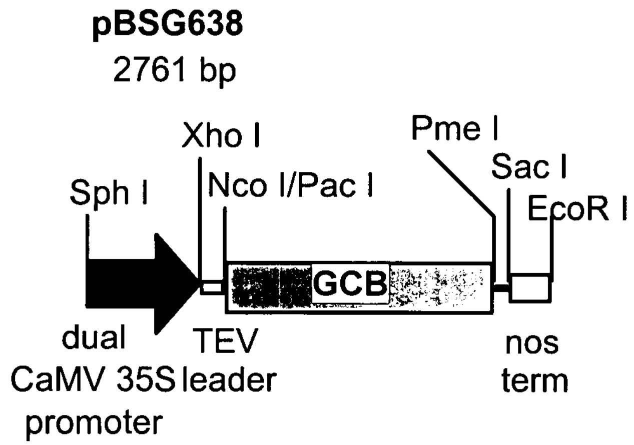

FIG. 14

VIRAL VECTOR FOR rGCB EXPRESSION

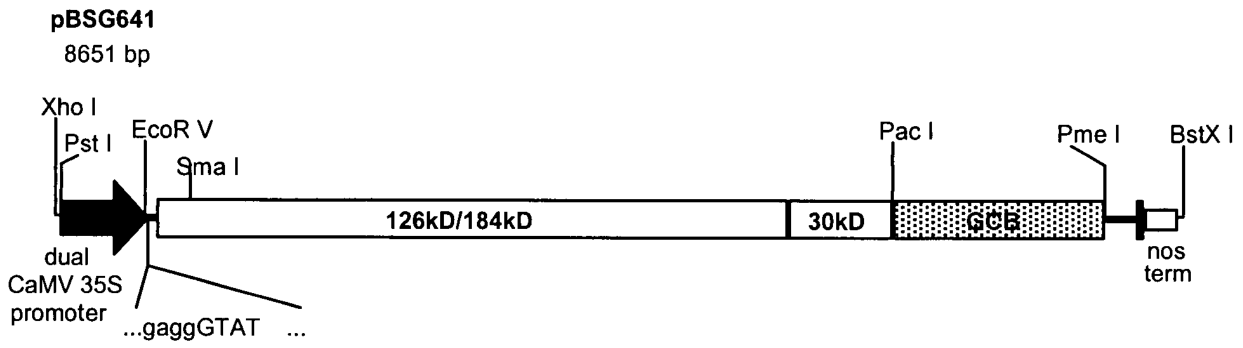

FIG. 15